be allowed to make copies of any material deemed confidential; and (3) confidential materials should be reviewed only in connection with FCC personnel in attendance. Lastly, without limiting the range of sanctions that the FCC has at its disposal for violations of its rules or orders, TIA proposes that the FCC dismiss any complaint in which a party thereto violates rules or orders regarding confidentiality. TIA also asks the FCC to consider additional sanctions, including fines or preclusion from appearing before the FCC, for any party that violates confidentiality orders after a case has been completed.

4. Formal Dispute Resolution.

The *NPRM* proposes to provide potential complainants three opportunities to submit complaints under Section 255 rather than two opportunities that are available under the Commission's existing rules. With regard to complaints filed against common carriers, a complainant today has the ability to file an informal complaint and if that is not satisfied, to institute the formal complaint process. The Commission's Section 255 proposal is substantially different because a complainant can file a fast track complaint and if that is not satisfied it can file an informal complaint and if the informal complaint is not concluded satisfactorily the complainant can file a formal complaint. The process proposed in the *NPRM* is, therefore, more burdensome on potential respondents than any other complaint procedure established by the Commission.

Requiring manufacturers to defend against a Section 255 complaint three times is an undue and unjustified burden which is clearly inconsistent with the Commission's goal of

making the Section 255 implementation process one which is an efficient allocation of resources. Allowing complainants to have three bites of the apple is especially burdensome to smaller manufacturers who may not have the internal or external resources to commit to defending themselves three times based on a single allegation.

Consumers are also adversely affected by the FCC's proposal since they, too, will be required to expend resources in each of the three levels of complaint processes proposed in the NPRM. Though the fast track and informal complaint processes would cause the Commission and manufacturers to expend more resources than consumers, the same is not true for the formal complaint process. In the formal complaint process the complainant has the burden of moving the case forward, including carrying the financial and resource costs of engaging in the discovery process and costs associated with being represented by counsel in administrative litigation.

The Commission recognized that it is not efficient to require entities to expend substantial resources responding to complaints when such resources could be put to better use providing more accessible products.[127] Thus, rather than allowing three levels of complaints to be filed for violations of Section 255, TIA suggests the number be reduced to two. It further suggests that the first phase should be TIA's proposed DRP since, as discussed above, it provides the right environment for the voluntary resolution of disputes over accessibility with a minimum of government intervention. The second level in the Section 255 complaint process should be establishment a modified formal complaint process.

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[127] *NPRM* ¶ 124.

For Section 255 complaints, the FCC should use a modified common carrier formal complaint process which would be "...resolved on a written record consisting of a complaint, answer and joint statement of stipulated facts, disputed facts and key legal issues."[128] but without some of the more burdensome provisions of the common carrier formal complaint process such as discovery which would be costly to both manufacturers and consumers. Thus, the modified formal complaint process has the benefit of allowing the Commission to make a decision on the basis of pleadings and other "on-the-record" information submitted to the Commission on the one hand without requiring all parties to expend substantial funds to engage in the discovery process.

5. Alternative Dispute Resolution Process.

In addition to fast track and the use of informal/formal complaint processes, the Commission proposes to use Alternative Dispute Resolution ("ADR") procedures as the third prong of its Section 255 enforcement effort.[129] TIA does not object to the Commission adopting rules which provide for ADR of Section 255 complaints. However, TIA asserts that the use of ADR techniques should not be used for the first few years after final rules in this proceeding are adopted.

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[128] *See* § 1.720.

[129] *NPRM* ¶ 158.

The Commission correctly points out that ADR techniques are not necessarily appropriate in every case, specifically in (1) precedent setting cases; (2) cases bearing on significant new policy questions; (3) cases where maintaining established policies is of special importance; (4) cases significantly affecting persons or organizations who are not parties to the proceeding; (5) cases where a formal record is essential; and, (6) cases where the agency must maintain continuing jurisdiction with authority to alter its disposition in light of changed circumstances.[130] With regard to complaints filed pursuant to Section 255, virtually all of the factors listed above are present since few complaints have been submitted to the Commission and none have been decided by the Commission or appealed to higher judicial authority. Until the FCC has issued enough decisions on a sufficiently wide variety of accessibility complaints, there will be no general body of knowledge on which experts can rely.

Furthermore, while there are persons and organizations which can provide useful thinking about potential accessibility solutions in the context of telecommunications in general and Section 255 specifically, there are no persons or organizations that can legitimately claim they are "expert" in determining whether it is "readily achievable" to incorporate one or more accessibility features into telecommunications equipment and CPE. Until the Commission, manufacturers and affected members of the public agree that a sufficiently large body of knowledge exists on what is or is not "readily achievable" in the context of complex issues of "technology, economics and medicine,"[131] the Commission should not delegate to outside

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[130] *NPRM* ¶ 157.

[131] *NPRM* ¶ 158.

sources the authority expressly granted to it by Congress to resolve complaints filed under Section 255.

Similarly, at this point in time it is premature for the Commission to refer inquiries and complaints to a joint industry/disability advisory panel for opinion.[132] As noted above, there is very little expertise in this area today and it is doubtful that a joint industry panel would be able to be helpful in the early years of resolving Section 255 complaints.

6. Defenses to Section 255 Complaints.

TIA supports the concept that it is appropriate to give weight to the good faith efforts of a manufacturer to comply with Section 255 by taking actions that show it has attempted to make products more accessible in the evaluation of Section 255 complaints.[133] It specifically supports the Commission's proposal to use four broad categories of measures which, if taken by manufacturers, are evidence of their good faith efforts, i.e., (1) self-assessment of whether it is "readily achievable" to incorporate accessible features in products; (2) external outreach efforts to ascertain accessibility needs and possible solutions; (3) internal processes to ensure early and continuing consideration of accessibility concerns; and (4) user information and support.[134] In fact, manufacturers who engage in these types of activities and others which show

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[132] *NPRM* ¶ 161.

[133] *NPRM* ¶ 164.

[134] *NPRM* ¶ 165.

that they are sincere about "doing the right thing," should be given a rebuttable presumption that they have complied with Section 255.

Commission evaluation of Section 255 complaints should place a great deal of emphasis on the types of efforts described above, especially in the first few years after rules are adopted by the Commission. Greater emphasis on the "processes" used by manufacturers may be more important than the level of accessibility that can be readily achieved since it will take some time for manufacturers to engage in the outreach process and come to a more complete understanding of the needs of persons with disabilities and then to evaluate how best to incorporate accessibility features into products which meet those needs.

With regard to outreach and the ability of smaller companies to engage in that process, TIA supports the Commission's proposal to look favorably upon outreach conducted by consortia or trade associations.[135] In fact, TIA supports the ability of manufacturers of any size to be able to take advantage of the outreach efforts of consortia and trade associations. Because the ultimate goal of Section 255 implementation is to make telecommunications equipment and CPE more accessible to persons with disabilities, the Commission should be concerned that companies, both large and small, make whatever efforts are necessary to gain the knowledge which will enable them to increase accessibility.

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[135] *NPRM* ¶ 166, n.297.

7. Penalties for Non-Compliance.

The Commission lists those provisions of the Communications Act of 1934, as amended, which provide it with authority to impose penalties on manufacturers and others who are subject to Section 255.[136] TIA does not dispute the Commission's listing but does note that the language of the NPRM is ambiguous on the entities to which they are applied. In the *NPRM* the Commission states:

> Section 312 of the Act also provides for the issuance of a cease and desist order to a station licensee or construction permit holder, for the willful or repeated violation of or failure to observe any provision of the Communications Act. We believe Sections 4(i) and 208 of the Act provide a basis for such an order with respect to non-licensees.
>
> Sections 207 and 208 provide for the award of damages for violations by common carriers and arguably others. We seek comment on the relationship between Sections 207 and 208 and Section 255, and between implementing rules under each. We ask commenters to specifically address what circumstances would warrant imposition of damages where Section 255 is found to have been violated, and how such damages could be calculated.[137]

The Commission's use of the terms "non-licensees" and "common carriers and arguably others" are of concern to TIA. TIA assumes that the references to "non-licensees" and "common carriers and arguably others" are references to entities other than manufacturers since there is no legal authority to apply Sections 312, 207 and/or 208 to manufacturers absent Congress amending the Communications Act. Section 312 is expressly applicable to Title III

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[136] *NPRM* ¶ 172.

[137] *NPRM* ¶ 172, citations omitted.

radio licensees while Sections 207 and 208 are expressly applicable to common carriers. Because the language of Sections 312, 207 and 208 are clear and unambiguous on their face, the Commission can not expand the express and literal language of those sections to include manufacturers of telecommunications equipment and CPE to the extent that they are not otherwise Title III licensees or common carriers. In addition, TIA opposes the FCC's suggestion that retrofitting is an appropriate penalty for noncompliance.[138]

8. Additional Implementation Issues.

The FCC should refrain from establishing itself as a clearinghouse for disabilities issues, including product information and accessibility solutions. The burden imposed on the Commission to collect and maintain such information will be considerable. Moreover, there are outside organizations from industry, the disability community and elsewhere which will provide that information. Absent compelling reasons to become involved in a process which is already being provided and will continue to be provided by private, non-governmental sources, the Commission should devote its limited resources to other areas of Section 255 implementation.

Similarly, the FCC should not publish information on the performance of manufacturers in providing accessible products, especially based on statistics generated by the Commission's fast track process. Neither should the FCC institute any program of awarding a "seal or other imprimatur"[139] of compliance by a manufacturer.

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[138] *Id.*

[139] *NPRM* ¶ 174.

As discussed above, the Commission's fast track process is not likely to result in the resolution of many complaints because, among other things, it will not provide manufacturers sufficient detail on the nature of the violation and will not provide sufficient time to respond in detail to a complaint. As a result, the statistics derived from the fast track process are likely to be flawed. For example, Manufacturer A (who may have an overall good record of making accessible products) may "lose" two of three fast track complaints while Manufacturer B (who has a bad record of overall Section 255 compliance) may "win" two of three fast track complaints. If the Commission were to publish statistics showing that Manufacturer A is worse than Manufacturer B or if the Commission were to give Manufacturer B a "seal or other imprimatur" of Section 255 compliance based on the fast track process, the public would be deceived into believing Manufacturer B was "better" than Manufacturer A in providing accessible products. Such actions could artificially distort the operation of an otherwise competitive market and could have an unfair and material adverse impact on Manufacturer A.

Disability organizations are keenly aware of manufacturers' obligations under Section 255. Moreover, there are private organizations that currently distribute information about accessible technologies and accessible products. As time goes on, more and more information about accessible products and technologies will be available from private sources. Similarly, it will not take long before the public learns which manufacturers have a good record of compliance and which do not. As a result, TIA asserts that the Commission should refrain from using its resources to provide information which (1) may be statistically invalid and (2) is otherwise available from private sources.

VI. INTERIM TREATMENT OF COMPLAINTS.

TIA supports the Commission's conclusion that there is no need to adopt interim complaint procedures. Furthermore, TIA believes the Commission should make it abundantly clear that restraint should be exercised before filing complaints under Section 255. Filing complaints in advance of the Commission's adoption of rules implementing Section 255 will not serve the public interest for two reasons. First, because the Commission has no specific procedures for handling Section 255 complaints at the present time, the process will lead to inefficient handling of complaints. Second, the resources of the Commission, manufacturers and others will be devoted to handling litigation rather than trying to come up with solutions to increasing accessible products.

VII. CONCLUSION.

In conclusion, TIA wishes to reaffirm the commitment of its member companies to the goal of increased access to telecommunications for individuals with disabilities. TIA believes access will be increased over time by market forces as well as the force of technological innovation in this competitive industry. The foregoing comments represent TIA's beliefs as to how the FCC's rules can best work to provide the industry with incentives to incorporate accessibility features in its products and services, without also stifling the very innovation that is necessary to reach the ultimate goal.

Towards that end, TIA strongly encourages the FCC to adopt a product line rather than a product-by-product approach to the accessibility requirement. It is only by providing manufacturers with discretion as to how to incorporate accessibility features that meaningful access can be provided to the diverse group of individuals with disabilities. TIA further urges the FCC to tailor the definitions of certain key statutory terms to the context of the telecommunications industry. Definitions adopted verbatim from the ADA, for example, may not prove as useful in this context. Finally, TIA asks the FCC to adopt TIA's DRP instead of the FCC's fast track proposal for resolving access problems. TIA believes there is much to be gained from allowing manufacturers to attempt to address any problems through direct contact with consumers, rather than involving the FCC at first instance.

Respectfully submitted,

TELECOMMUNICATIONS INDUSTRY ASSOCIATION

Grant Seiffert /KEL

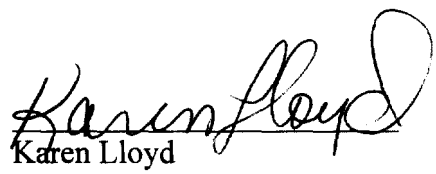
Grant Seiffert,
Vice President, Governmental Relations
Matthew J. Flanigan
President
1300 Pennsylvania Avenue, NW
Suite 350
Washington, D.C. 20004
(202) 383-1483

CERTIFICATE OF SERVICE

I, Karen E. Lloyd, do hereby certify that on this 30th day of June 1998, a copy of the foregoing Comments of the Telecommunications Industry Association has been served, via hand delivery, upon the following:

Susan Kimmel
Attorney Advisor
Wireless Telecommunications Bureau
Federal Communications Commission
2025 M Street, N.W.
Room 7002
Washington, D.C. 20036

International Transcription Service
Suite 140
1919 M Street, N.W.
Washington, D.C. 20036



Karen Lloyd

A

STRATEGIC
POLICY
RESEARCH

7500 OLD GEORGETOWN ROAD SUITE 810 BETHESDA, MARYLAND 20814 (301) 718-0111 (301) 215-4033 fax
EMAIL spri-info@spri.com

An Evaluation of the Access Board's Accessibility Guidelines

Table of Contents

EXECUTIVE SUMMARY

> Accessible Design is a balancing act. To begin with, we must acknowledge that it is not possible to design everything so that it can be used by everyone.
>
> Gregg C. Vanderheiden[1]

The Access Board has proposed rules to implement Section 255 of the 1996 Telecommunications Act. Unfortunately, these proposed rules would, in the long run, do more harm than good to people with disabilities and would impose several significant costs on our economy. Specifically, the proposed rules would:

- Damage the innovation process,
- Distort the telecommunications and consumer electronics industries towards inefficiently small firms,
- Encourage the export of design and manufacturing employment,
- Force equipment to include a complex assortment of multiple and sometimes conflicting features, and
- Impose substantial costs as firms attempt to assure that their design processes meet the criteria of the proposed rules and in resolving disputes if any party expresses dissatisfaction with the outcome.

Innovation is at the heart of economic progress. The telecommunications manufacturing industry has been an especially rich source of practical benefit to Americans with disabilities. These innovations have been the natural fruit of an industry has been left largely unregulated and is fiercely competitive. The proposed rules would impose a significant burden on the innovation process and therefore should be especially suspect. We urge the Commission to adopt policies which harness, not dampen, the energies of the market in this regard.

We also fear that the proposed rules would distort the marketplace. Smaller firms would be able to argue that they lack the resources and staff needed to carefully document compliance with the proposed rules. Similarly, the Commission would probably be less likely to press hard in enforcing such rules a smaller manufacturer. A natural consequence of such effects would be to burden disproportionally innovation efforts in larger organizations and move the economy away from economic efficiency.

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[1] *Accessible Design of Consumer Products*, 1992, Working Draft 1.7, by Gregg C. Vanderheiden and Katherine R. Vanderheiden.

We also believe that the rules create a back-door incentive to export jobs. If a product is assembled in the United States from high-level subassemblies, the assembler can rightfully claim to be the manufacturer. In documenting the design process, the manufacturer can point to the capabilities of the high-level subassemblies as defining what is readily achievable. An overseas manufacturer who wishes to sell a product in the United States can provide the product as a collection of high-level subassemblies to a manufacturer in the United States. Such a two-step distribution process designed to get around the rules requiring consideration of effects on people with disabilities would be hard to distinguish from other similar activities that are carried out for sound economic purposes.

The Access Board's Guidelines seem to rest on an interpretation of Section 255 that requires that *every* new telecommunications product address be designed according to strict accessibility norms. As proposed, the Guidelines suggest going even further: that *every* product address *every* accessibility requirement by means of an engineering philosophy known as "Universal Redundancy and Selectibility." By this approach, each product would be endowed with the ability to switch between modes, each mode providing a different user interface configuration for a different constellation of disabilities. The epigram above, from one of the world's leaders in the design of equipment to meet the needs of the disabled community, recognizes the impossibility of such a mandate.

Consider a widely used communications product — the pager. Most pagers notify people that someone is trying to call them and provide them with a short numeric message telling the user what number to call back. But, there are also other pagers that provider users with voice messages or with text messages. While pagers are widely used and accepted, few understand the difficult technical challenges that have to be met in order for pagers to operate reliably, to support long battery life, and to be able to detect pages even in inside offices in an office building. Making every pager accessible to the blind would increase their size, decrease battery life, and increase the cost. Individuals with vision impairments have other alternatives, such as voice pagers or PCS phones, that offer them similar communications alternatives. Requiring every pager to be useful to everyone, no matter what his or her disability, would reduce the options available to the hearing-impaired and sight-impaired alike.

Finally, we believe that the out-of-pocket costs of complying with the proposed rules and establishing the fact of such compliance in an adversarial setting will be high.

The proposed Guidelines require that distinct, affirmative regulatory obligations arise under the Act at every stage of activity in the development of new telecommunications products. We estimate the scale of the development process affected by the proposed regulations. We also develop a model of the development process including the effects of the proposed rules. This model indicates that the added development costs would fall in the range of $450 to $750 million per year. As a check on this calculation, we consider similarities with the formal compliance required of manufacturers in Parts 68 and 15 and show that the numbers calculated by our model are consistent with the FCC's experiences in these programs. We also consider the added costs of making all products accessible to all consumers. We briefly sketch examples of typical products altered to address merely two modes of disability, at an annual industry-wide cost of $250 million in materials alone.

We conclude with a discussion of alternative approaches the Commission might consider, based on previous Commission undertakings that have been widely accepted as successful. We propose that the Commission conduct annual reviews of the state of accessibility to the nation's telecommunications infrastructure and act as a clearinghouse for identifying shortcomings in accessibility and new techniques for addressing them. Similar approaches have enjoyed considerable success, for example, in establishing access to satellite video distribution in outlying areas of the country otherwise not served by multichannel video distributers. We argue that an outcome-based regulatory regime would clearly meet the intentions of the statute and would likely result in the sort of economic activity likely to generate accessibility instead of bureaucracy.

ABOUT THE AUTHORS

Charles Jackson earned his PhD in electrical engineering from MIT. He worked as a digital designer and computer programmer in industry before working in government at the FCC and for the House Commerce Committee. He has written on policy issues of accessibility for people with disabilities, contributed to research projects to develop accessible electronic mail systems for the deaf and hard of hearing, and has testified on hearing aid compatibility before the Senate Commerce Committee. Also among his activities was a term on the board of directors of the Northern Virginia Resource Center for the Hearing Impaired.

Ross M. Richardson recently became Vice President of Rates & Tariffs at Zephyr Telecommunications, Inc. Dr. Richardson was formerly a principal in Strategic Policy Research, Inc., and closely involved in the preparation of this report. Prior to joining SPR, he was a Member of Technical Staff in the Network Systems Division at AT&T Bell Laboratories and for Network Architecture at Southwestern Bell Corporation (SBC). At AT&T, he developed new telecommunications network services based on Integrated Services Digital Network (ISDN), Intelligent Network (IN), and conventional telephony technologies. At SBC, he studied IN performance and developed strategic architecture plans for SBC's mobile, landline, paging and video networks in the United States and overseas.

John Haring is a principal in Strategic Policy Research, Inc. Dr. Haring formerly served as Chief Economist of the Federal Communications Commission and as Chief of the Commission's Office of Plans and Policy. He has prepared studies on a wide range of subjects including a large number of papers dealing with telecommunications economics and regulation. He is the author of five papers in the FCC's Office of Plans and Policy Working Paper Series and the "Telecommunications" entry in the *Fortune Encyclopedia of Economics*. He is the coauthor (with Ronald Cass) of a recently published book on international trade in telecommunications equipment in the American Enterprise Institute's Studies in Telecommunications series (MIT Press).

This report was prepared for the Telecommunications Industry Association. However, the views in this report are those of the authors and do not necessarily represent the views of TIA or any member of TIA.

The authors have extensive experience in the areas of telecommunications and economics. In addition to basic research and information gathering from a variety of relevant public sources (including the FCC), this report reflects interviews with engineering and management staff from several telecommunications equipment manufacturers and various data they provided. We focused our study efforts in three areas: (1) understanding the scope and extent of the communications needs of persons with disabilities, (2) identifying the potentially beneficial and adverse consequences of different types of remedies, and (3) estimating the costs of compliance with what we regard as the flawed approach embodied in the proposed Guidelines. We developed several alternative means of getting a handle on compliance costs and, at different times, reviewed our analyses with TIA members to supply a reality check. While we wish to acknowledge and express our appreciation for

useful input and comments from TIA members and the cooperation and support of TIA, we wish to make clear that the analysis and our conclusions are our own.

I. INTRODUCTION

By any reasonable cost-benefit calculus, the benefits of improvements in communications services to people with disabilities flow to every American. Every person without disabilities is only a moment away from acquiring a disability — a slip in the bathtub or on the ice, an opportunistic infection, an immune disorder, or normal accompaniments of aging that can cause a disability. Thus, every person benefits (at least in an expected-value or option-value sense) from improvements in communications for people with disabilities.

Similarly, almost every improvement in communications technology aimed at the general population helps many of those with disabilities. First, people with disabilities participate directly in the larger market for communications equipment and services. In many cases individuals with and without disabilities can use the same equipment. A person requiring a scooter to get around may have no limitations in using desktop telephone equipment. In other cases, many product features made possible by technology enhance the usability of general market equipment by persons with disabilities. Second, people with disabilities benefit when communications technology permits the economy to operate more efficiently — thus lowering the cost of the goods and services they consume. Similarly, people with disabilities benefit from the use of improved communications technologies by those with whom they communicate. For example, longer battery lives in wireless telephones means that the people they wish to contact are more likely to have their portables turned on.

In Section 255 of the Telecommunications Act of 1996 Congress imposed an obligation on manufacturers of telecommunications equipment and customer premises equipment to ensure that such equipment is "designed, developed, and fabricated to be accessible to and usable by individuals with disabilities, if readily achievable." While Congress assigned enforcement of this statutory provision to the Federal Communications Commission,[1] Section 255 charges the Architectural and Transportation Barriers Compliance Board with developing, in conjunction with the Commission, "guidelines for accessibility" of the equipment in question. Section 255 reflects Congress's view that the market alone cannot be counted on to adequately serve the needs of those with disabilities.

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[1] The Commission is generally authorized to enforce the Act and amendments at Section 710(a); Section 255(f) specifically entrusts the Commission with exclusive jurisdiction over complaints arising under Section 255.

We concur with that view — but we are deeply concerned that regulations designed ensure that products are accessible will result in a long-run loss of benefits to those with disabilities as well as more general harm to our economy.

Two prototypical problems — hearing aid compatibility and access to windowed computer operating systems and the World Wide Web by those vision disabilities — illustrate the problems of accessibility for telecommunications and information services. It is also our opinion that these specific problems lie at the heart of concerns about accessibility to telecommunications. We explain each of these problems briefly.

Telephones without magnetic fields do not couple to the telecoils in many hearing aids. Relatedly hearing aids with telecoils can act as radio receivers and can receive interference from digital cellular phones.[2] Regulations, in place for many years, require that telephones be built to support telecoils. The problem of interference is much harder — the most cost-effective solution is to modify the design of hearing aids to eliminate their susceptibility to such interference. However, this solution does not deal with the problems of existing hearing aids.

Programs running under Windows 95 and other similar graphics interfaces are difficult or impossible for those with vision disabilities to use.[3] This is not simply a question of operating system design. Although these operating systems permit software applications to be designed to support both text-based and graphics controls, applications designers, many of them independent of Microsoft or any hardware manufacturer, often fail to take advantage of such options. Similarly, many applications

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[2] This problem is not limited to hearing aids with telecoils. Many types of consumer equipment can similarly pickup interference from radio transmissions unless they are designed to reject such interference. Such interference became quite acute in the 1970s when CB radio became popular. Hearing aids without telecoils may also be subject to such interference in some cases. But, the telecoil is, in essence, designed to be a small antenna and to pick up electromagnetic signals. In the case of hearing aids and cellular phones, the hearing aid can pick up signals both from the transmitted digital cellular signal and from the digital processing in the cellular phone. Telecoils can also pickup interference from fluorescent lights, electric motors, and computers.

[3] Microsoft Windows is the best known of such graphical interfaces. But Apple's Macintosh and the workstation X-Windows system depend in a similar fashion on the use of a mouse and screen display to control a computer.

and websites on the World Wide Web are difficult or impossible for those with vision disabilities to use.[4]

A moment's reflection should allow one to empathize with someone who buys a cellular telephone only to find that her daughter cannot use the cellular phone because the hearing aid receives interference from the digital cellular signal or with the frustration of someone who is blind and is finding services on the Internet less and less accessible as more visual elements are incorporated into web pages.

It appears that specific accessability problems such as these prompted the enactment of Section 255. Their solution should be achievable at low cost and provide significant potential benefit to those with disabilities.

Although we agree with Congress's determination that failures may occur in the telecommunications equipment market leading to harms to those with disabilities, we believe that great care must be taken not to do even more harm with a highly generalized approach to attempting to correct those market failures.

II. Putting the Problem in Perspective

The Census Bureau reports that there are about 50 million Americans with some form of disability and 25 million with severe disabilities.[5] A small fraction of these people have problems using the telephone. The Census Bureau reports that about 3 million people have difficulty using the

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[4] Access to the web by those with vision disabilities has gained considerable attention. See, for example, the article "On the Web — and Blind," by Don Jellinek, in the Jan/Feb 1998 issue of *OnTheInternet*, or "Bringing the Visual World of the Web to the Blind,: by Debra Nussbaum, *New York Times*, March 26, 1998, page E8. It is also important to train web designers to make their web pages accessible to those with vision disabilities.

Relatedly, Microsoft recently teamed up with euroBRAILLE to make the Microsoft Windows operating systems more accessible to those with impaired vision. (*Microsoft Daily News*, June 11, 1998)

[5] *Americans with Disabilities: 1994-95*, by John M. McNeil, Current Population Reports, U.S. Department of Commerce, Census Bureau P70-61, August, 1997.